

RICE-FLOUR HYDROLYSATES FAT SUBSTITUTE

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BACKGROUND OF THE PRESENT INVENTION

Field of the present invention

Embodiments of the present invention relate to food substitutes for fats, and more particularly to rice flours, rice syrups, and honey gelatinized by amylase enzymes and extrusion under temperature and pressure to substitute shortening.

Description of Related Art

Shortenings and other fats in foods represent very high calorie sources in people's diets. So many people who are trying to reduce their chances of heart disease, lose weight or maintain a healthy weight, try to avoid such fat calories as much as possible. One way to do this has been to substitute animal fats with vegetable fats, e.g., replacing butter with margarine. The margarine traps water in a gel by using proteins and carbohydrates. Another strategy has been to eliminate the fat altogether, but still keep the original taste and texture as much as possible.

Since fats play a very important role in food texture and flavor, the substitutes must closely mimic the behavior of fats in cooking and in the finished food. Various commercial products have been introduced in the United States. For example, in 1996 the Food and Drug Administration (FDA) approved OLESTRA as a fat substitute in food. Other similar fat substitutes include OATRIM, Z-TRIM, and NU-TRIM developed by George E. Inglett, Ph.D., of the USDA.

Chienkuo Ronnie Yuan describes starch emulsifier compositions and methods in two United States Patents, 5,755,890, issued May 26, 1998, and 6,017,388, issued Jan. 25, 2000. The methods heat the starch in the presence of an emulsifier and can be further treated to obtain greater than 20% short-chain amylose. But these methods require an emulsifier which adds cost and defeats some of the mouthfeel and other texture qualities being sought. Such Patents are incorporated herein by reference.

A simple pH-adjusted mixture of rice syrup and fruit juices is marketed as FRUITRIM. The shortening called for in various recipes for cakes, breads, and cookies, is suggested by the makers to be replaced with equal amounts of FRUITRIM.

United States Patent 5,492,715, issued Feb. 20, 1996, describes a dual function fruit concentrate sweetener and fat substitute. Such Patent is the basis for FRUITRIM. A blend of hydrolyzed starch and a fruit concentrate is suggested where the starch source is hydrolyzed to a 55-65 value dextrose equivalent. The final product is suggested as a replacement for some or all of the fat components in conventional foods. Unfortunately, such methods produce only simple blends that do not resemble fat. Such Patent is incorporated herein by reference.

Prior art starch processes that do not use extrusion require relatively large amounts of water, e.g., 70-80%. Such water is needed to hydrate and rupture the starch molecule. The water also provides heat transfer, a source of water molecules during the hydrolysis reaction in the presence of enzymes, and it aids in the dispersion of the starch.

SUMMARY OF THE PRESENT INVENTION

Briefly, a starch hydrolysis method embodiment of the present invention comprises mixing rice flour and rice syrup, honey
5 or another similar sweetener in equal parts, adding amylase enzymes to the mixture, and extruding for a few seconds at an elevated pressure and temperature. Water may be added to the rice flour mixture to adjust the final product texture. A second extrusion can be used to adjust the pH by inactivating
10 the amylase enzymes. In a second starch hydrolysis method embodiment of the present invention, one part of water is mixed with five parts of rice flour. Then amylase enzymes are added to the mixture for extrusion for a few seconds at an elevated temperature. The extrusion products are then
15 packaged as food ingredients.

An advantage of process embodiments of the present invention is that a method is provided for starch hydrolysis that is quick, uses less water, and operates at higher temperatures.

20 Another advantage of embodiments of the present invention is that a replacement food product is provided that looks and functions like shortening but contains no fats.

A further advantage of embodiments of the present invention is that a fat-replacement product is provided that
25 includes proteins that can act as emulsifiers.

A still further advantage of the carbohydrate-based food product embodiments of the present invention is that replacing fat on a one-to-one basis reduces the calories/gram by over fifty percent. Fat has nine calories/gram, whereas
30 carbohydrates have four calories/gram.

The above and still further objects, features, and advantages of embodiments of the present invention will become apparent upon consideration of the following detailed